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## WHAT IS CLAIMED IS

1. An ultra-thin copper foil with a carrier  
comprised of a carrier foil, a peeling layer, and an  
ultra-thin copper foil, wherein said ultra-thin copper  
5 foil and said peeling layer are provided between them  
with a strike plating layer and wherein said ultra-thin  
copper foil and said strike plating layer are one of a  
phosphorus-containing copper layer and a phosphorus-  
containing copper alloy layer.
- 10 2. An ultra-thin copper foil with a carrier  
comprised of a carrier foil, a peeling layer, and an  
ultra-thin copper foil, wherein said ultra-thin copper  
foil and said peeling layer are provided between them  
with a strike plating layer comprised of one of a  
15 phosphorus-containing copper layer and a phosphorus-  
containing copper alloy layer, said strike plating layer  
is provided on it with a copper plating ultra-thin layer,  
and said ultra-thin layer is provided on it with said  
ultra-thin copper foil comprised of one of copper and a  
20 copper alloy.
3. An ultra-thin copper foil with a carrier  
comprised of a carrier foil, a peeling layer, and an  
ultra-thin copper foil, wherein said ultra-thin copper  
foil and said peeling layer are provided between them  
25 with a strike plating layer comprised of one of a

phosphorus-containing copper layer and a phosphorus-containing copper alloy layer, said strike plating layer is provided on it with a copper plating ultra-thin layer, and said ultra-thin layer is provided on it with said  
5 ultra-thin copper foil comprised of one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer.

4. An ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an  
10 ultra-thin copper foil, wherein said ultra-thin copper foil and said peeling layer are provided between them with a strike plating layer comprised of one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer, said strike plating layer  
15 is provided on it with an ultra-thin layer comprised of one of a phosphorus-containing copper layer and phosphorus-containing copper alloy layer, and the ultra-thin layer is provided on it with said ultra-thin copper foil comprised of one of copper and a copper alloy.

20 5. An ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil, wherein said ultra-thin copper foil and said peeling layer are provided between them with a strike plating layer comprised of one of a  
25 phosphorus-containing copper layer and a phosphorus-

containing copper alloy layer, said strike plating layer is provided on it with an ultra-thin layer comprised of one of a phosphorus-containing copper layer and phosphorus-containing copper alloy layer, and the ultra-thin layer is provided on it with said ultra-thin copper foil comprised of one of a phosphorus-containing copper and a phosphorus-containing copper alloy.

6. An ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil, wherein a surface roughness  $R_z$  of a surface of the carrier foil on the ultra-thin copper foil side is  $0.1\text{ }\mu\text{m}$  to  $5\text{ }\mu\text{m}$ , a surface roughness  $R_z$  of a carrier foil side of the ultra-thin copper foil provided on the peeling layer provided on said carrier foil surface is  $0.1\text{ }\mu\text{m}$  to  $5\text{ }\mu\text{m}$ , one of a copper and copper alloy layer covering at least 90% of the area of the surface of the peeling layer is formed at a position of the surface roughness  $R_z$  of the ultra-thin copper foil plus  $0.1\text{ }\mu\text{m}$  to  $0.2\text{ }\mu\text{m}$  at the ultra-thin copper foil side from the projections of the surface relief on the carrier foil side of the ultra-thin copper foil, and a peel strength after hot bonding of at least  $300^\circ\text{C}$  is  $0.01\text{ KN/m}$  to  $0.05\text{ KN/m}$ .

7. An ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an

ultra-thin copper foil, wherein a surface roughness  $R_z$  of a surface of the carrier foil on the ultra-thin copper foil side is  $0.1\ \mu\text{m}$  to  $5\ \mu\text{m}$ , a surface roughness  $R_z$  of a carrier foil side of the ultra-thin copper foil provided on the peeling layer provided on said carrier foil surface is  $0.1\ \mu\text{m}$  to  $5\ \mu\text{m}$ , one of a copper and copper alloy layer having a conductivity of at least 90% is formed at a position of the surface roughness  $R_z$  of the ultra-thin copper foil plus  $0.1\ \mu\text{m}$  to  $0.2\ \mu\text{m}$  at the ultra-thin copper foil side from the projections of the surface relief on the carrier foil side of the ultra-thin copper foil, and a peel strength after hot bonding of at least  $300^\circ\text{C}$  is  $0.01\ \text{KN/m}$  to  $0.05\ \text{KN/m}$ .

8. An ultra-thin copper foil with a carrier as set forth in any one of claims 1 to 5, wherein the surface roughness  $R_z$  of the carrier foil surface at the ultra-thin copper foil side is  $0.1\ \mu\text{m}$  to  $5\ \mu\text{m}$  and the peel strength after hot bonding of at least  $300^\circ\text{C}$  is  $0.01\ \text{KN/m}$  to  $0.05\ \text{KN/m}$ .

9. An ultra-thin copper foil with a carrier as set forth in any one of claims 1 to 5, wherein a surface roughness  $R_z$  of a surface of the carrier foil on the ultra-thin copper foil side is  $0.1\ \mu\text{m}$  to  $5\ \mu\text{m}$ , a surface roughness  $R_z$  of a carrier foil side of the ultra-thin copper foil provided on the peeling layer provided on

said carrier foil surface is 0.1  $\mu\text{m}$  to 5  $\mu\text{m}$ , one of a copper and copper alloy layer covering at least 90% of the area of the peeling layer surface is formed at a position of the surface roughness  $R_z$  of the ultra-thin copper foil plus 0.1  $\mu\text{m}$  to 0.2  $\mu\text{m}$  at the ultra-thin copper foil side from the projections of the surface relief on the carrier foil side of the ultra-thin copper foil, and a peel strength after hot bonding of at least 300°C is 0.01 KN/m to 0.05 KN/m.

10            10. An ultra-thin copper foil with a carrier as set forth in any one of claims 1 to 5, wherein a surface roughness  $R_z$  of a surface of the carrier foil on the ultra-thin copper foil side is 0.1  $\mu\text{m}$  to 5  $\mu\text{m}$ , a surface roughness  $R_z$  of a carrier foil side of the ultra-thin copper foil provided on the peeling layer provided on  
15            said carrier foil surface is 0.1  $\mu\text{m}$  to 5  $\mu\text{m}$ , one of a copper and copper alloy layer having a conductivity of at least 90% is formed at a position of the surface roughness  $R_z$  of the ultra-thin copper foil plus 0.1  $\mu\text{m}$  to  
20            0.2  $\mu\text{m}$  at the ultra-thin copper foil side from the projections of the surface relief on the carrier foil side of the ultra-thin copper foil, and a peel strength after hot bonding of at least 300°C is 0.01 KN/m to 0.05 KN/m.

25            11. An ultra-thin copper foil with a carrier as set

forth in any one of claims 1 to 7, wherein said peeling layer is one of a chromium metal and chromium alloy.

12. An ultra-thin copper foil with a carrier as set forth in any one of claims 1 to 7, wherein said peeling  
5 layer is one of an oxide hydrate of a chromium metal and chromium alloy.

13. An ultra-thin copper foil with a carrier as set forth in any one of claims 1 to 7, wherein said peeling layer is formed by one of a chromium metal, chromium  
10 alloy, and oxide hydrate of one of a chromium metal and chromium alloy.

14. An ultra-thin copper foil with a carrier as set forth in claim 11, wherein the amount of deposited metal of one of a chromium metal and chromium alloy of the  
15 peeling layer is not more than  $4.5 \text{ mg/dm}^2$ .

15. An ultra-thin copper foil with a carrier as set forth in claim 12, wherein the amount of deposited metal of one of a chromium metal and chromium alloy in the peeling layer comprised of an oxide hydrate is not more  
20 than  $0.015 \text{ mg/dm}^2$ .

16. An ultra-thin copper foil with a carrier as set forth in claim 13, wherein the amount of deposited metal of one of a chromium metal and chromium alloy of the peeling layer is not more than  $4.5 \text{ mg/dm}^2$ .

25 17. An ultra-thin copper foil with a carrier as set

forth in any one of claims 1 and 5 to 7, wherein said peeling layer is one of nickel, iron, an alloy of the same, and an oxide hydrate containing the same.

18. A method of production of an ultra-thin copper  
5 foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including plating the surface of the carrier foil with one of chromium, nickel, iron, and an alloy of the same to form a peeling layer, forming on the peeling layer one of a  
10 phosphorus-containing copper layer and a phosphorus-containing copper alloy layer by strike plating in one of a phosphorus-containing copper and a phosphorus-containing copper alloy plating bath, and forming on it by plating an ultra-thin copper foil comprised of one of  
15 a phosphorus-containing copper and a phosphorus-containing copper alloy.

19. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including  
20 plating the surface of the carrier foil with one of chromium, nickel, iron, and an alloy of the same to form a peeling layer, strike plating the peeling layer with one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer in one of a  
25 phosphorus-containing copper and a phosphorus-containing



copper alloy plating bath, forming on the strike plating layer an ultra-thin layer by one of a copper and a copper alloy plating, and forming on the ultra-thin layer an ultra-thin copper foil by one of a copper and a copper alloy plating.

20. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including plating the surface of the carrier foil with one of chromium, nickel, iron, and an alloy of the same to form a peeling layer, strike plating the peeling layer with one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer by strike plating in one of a phosphorus-containing copper and a phosphorus-containing copper alloy plating bath, forming on the strike plating layer an ultra-thin layer by one of a copper and a copper alloy plating, and forming on the ultra-thin layer an ultra-thin copper foil by one of a phosphorus-containing copper and a phosphorus-containing copper alloy plating.

21. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including plating the surface of the carrier foil with one of chromium, nickel, iron, and an alloy of the same to form

a peeling layer, strike plating the peeling layer with one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer by strike plating in one of a phosphorus-containing copper and a phosphorus-containing copper alloy plating bath, forming on the strike plating layer an ultra-thin layer comprised of one of a phosphorus-containing copper and a phosphorus-containing copper alloy, and forming on the ultra-thin layer an ultra-thin copper foil by one of a copper and a copper alloy plating.

22. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including plating the surface of the carrier foil with one of chromium, nickel, iron, and an alloy of the same to form a peeling layer, strike plating the peeling layer with one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer by strike plating in one of a phosphorus-containing copper and a phosphorus-containing copper alloy plating bath, forming on the strike plating layer an ultra-thin layer comprised of one of a phosphorus-containing copper and a phosphorus-containing copper alloy, and forming on the ultra-thin layer an ultra-thin copper foil by one of a phosphorus-containing copper and a phosphorus-containing

copper alloy plating.

23. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including  
5 forming on the surface of the carrier foil having a surface roughness  $R_z$  of  $0.1\text{ }\mu\text{m}$  to  $5\text{ }\mu\text{m}$  a peeling layer, forming on the peeling layer an ultra-thin copper foil to give a surface roughness  $R_z$  of a carrier foil side of  $0.1\text{ }\mu\text{m}$  to  $5\text{ }\mu\text{m}$ , forming a strike plating layer by one of a  
10 pH3 to pH13 phosphorus-containing/not containing copper and phosphorus-containing/not containing copper alloy plating bath so that at least 90% of the area of the peeling layer surface is covered by a copper layer at a position of the surface roughness  $R_z$  of the ultra-thin  
15 copper foil plus  $0.1\text{ }\mu\text{m}$  to  $0.2\text{ }\mu\text{m}$  at the ultra-thin copper foil side from the projections of the surface relief on the carrier foil side of the ultra-thin copper foil, and forming on the strike plating layer one of a phosphorus-containing/not containing copper and copper  
20 alloy layer as the ultra-thin copper foil of a predetermined thickness.

24. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including  
25 forming on the surface of the carrier foil having a

surface roughness  $R_z$  of 0.1  $\mu\text{m}$  to 5  $\mu\text{m}$  a peeling layer, forming on the peeling layer an ultra-thin copper foil to give a surface roughness  $R_z$  of a carrier foil side of 0.1  $\mu\text{m}$  to 5  $\mu\text{m}$ , forming a strike plating layer by one of a  
5    pH3 to pH13 phosphorus-containing/not containing copper and phosphorus-containing/not containing copper alloy plating bath so as to give a copper layer having a conductivity of at least 90% at a position of the surface roughness  $R_z$  of the ultra-thin copper foil plus 0.1  $\mu\text{m}$  to  
10    0.2  $\mu\text{m}$  at the ultra-thin copper foil side from the projections of the surface relief on the carrier foil side of the ultra-thin copper foil, and forming on the strike plating layer one of a phosphorus-containing/not containing copper and copper alloy layer as the ultra-  
15    thin copper foil of a predetermined thickness.

25. A printed circuit board wherein an ultra-thin copper foil with a carrier as set forth in any one of claims 1 to 7 is used to form high density ultrafine interconnects.

20        26. A printed circuit board wherein an ultra-thin copper foil with a carrier produced by a method of production of an ultra-thin copper foil with a carrier as set forth in any one of claims 18 to 24 is used to form high density ultrafine interconnects.

25        27. A printed circuit board wherein an ultra-thin

copper foil with a carrier as set forth in claim 8 is used to form high density ultrafine interconnects.

28. A printed circuit board wherein an ultra-thin copper foil with a carrier as set forth in claim 9 is  
5 used to form high density ultrafine interconnects.

29. A printed circuit board wherein an ultra-thin copper foil with a carrier as set forth in claim 10 is used to form high density ultrafine interconnects.